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**REGIONAL SEMINARS** 2012  
The **Power of Data**



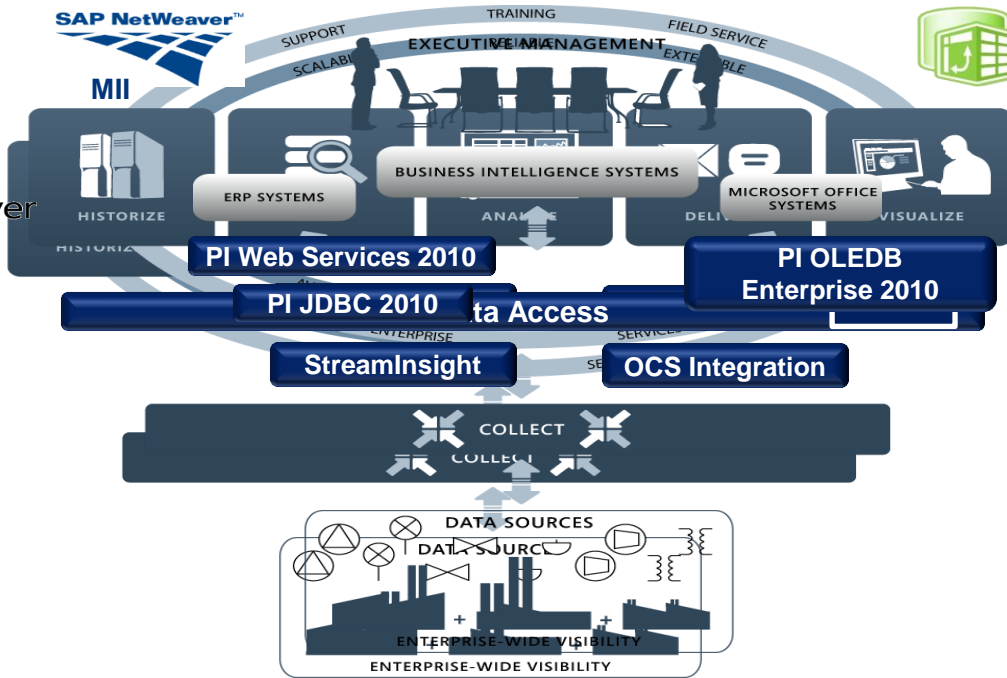
# PI Asset Framework

Presented by **OSIsoft**

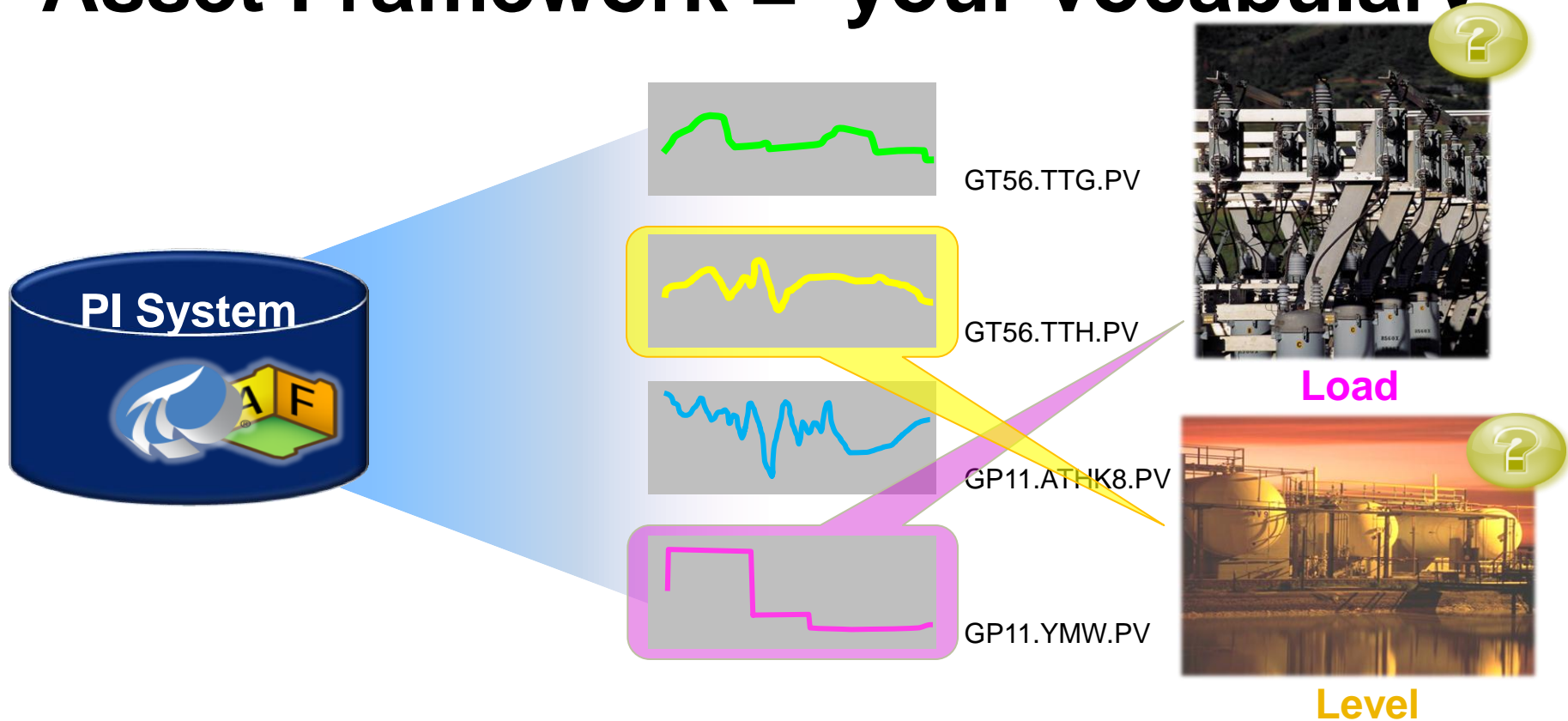
# The PI System



MII

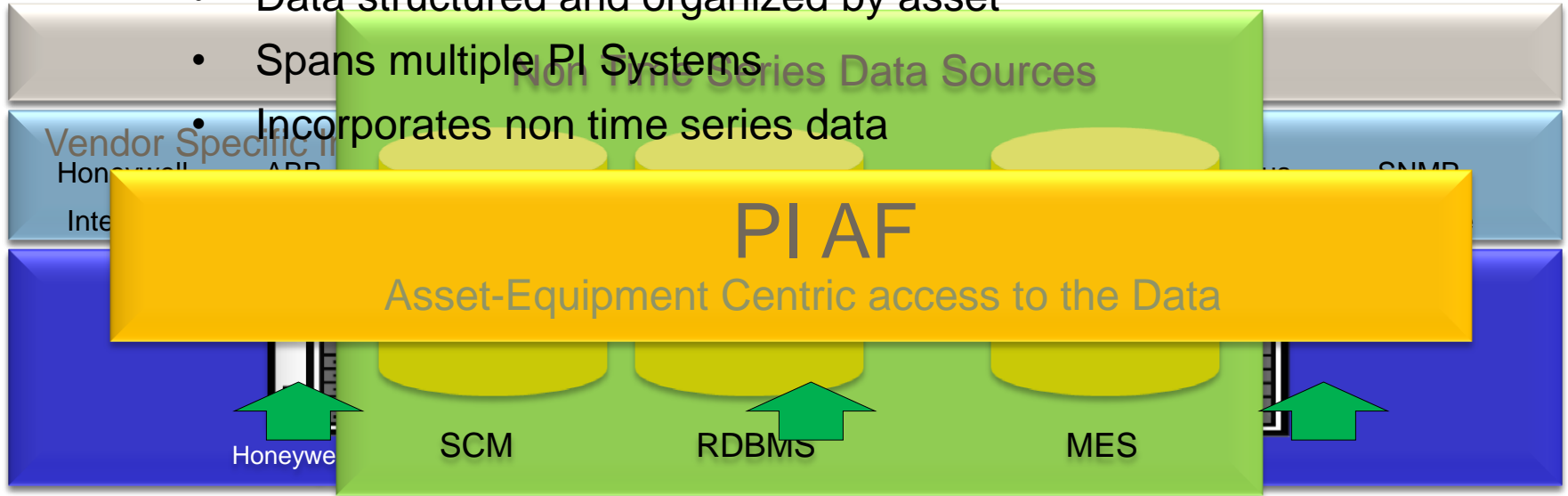


# Asset Framework = your vocabulary



# spans all your data

- Data structured and organized by asset
- Spans multiple PI Systems
- Incorporates non time series data



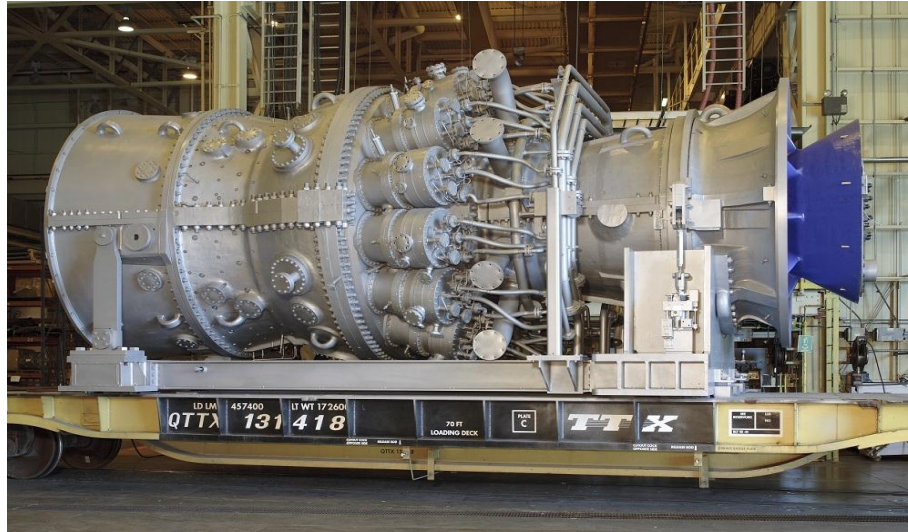
# Asset Centric PI System

- **PI AF provides an asset centric view of your plant**
- **Establish relationships**
  - Build hierarchies, categories and connectivity models
  - Relate asset properties to your disparate data
- **Standardize, common view**
  - Templates for similar assets
- **Apply domain knowledge via PI Notifications and analyzes**
- **Access your data via PI Data Access products**

# Build a Complete Picture of Your Asset

## PI Tags

- Inlet pressure
- Inlet flow
- Ambient temperature



## PI Tags

- Exhaust temperature
- Exhaust flow
- Measured MW output

## External Databases

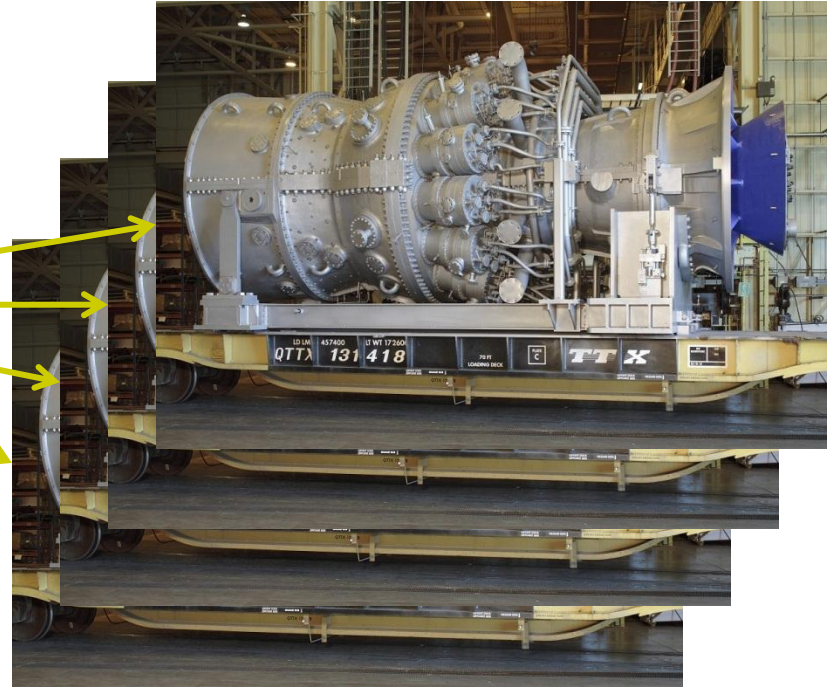
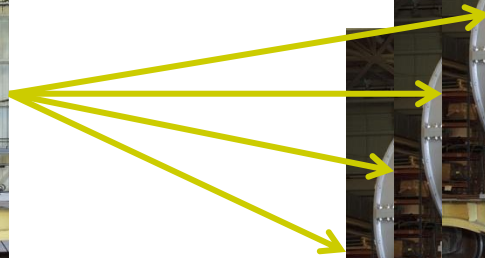
- Performance curves
- Last service date
- Design documents
- Inspection best practice

## Calculations

- Performance calculations
- KPI's



# Common View for Similar Assets





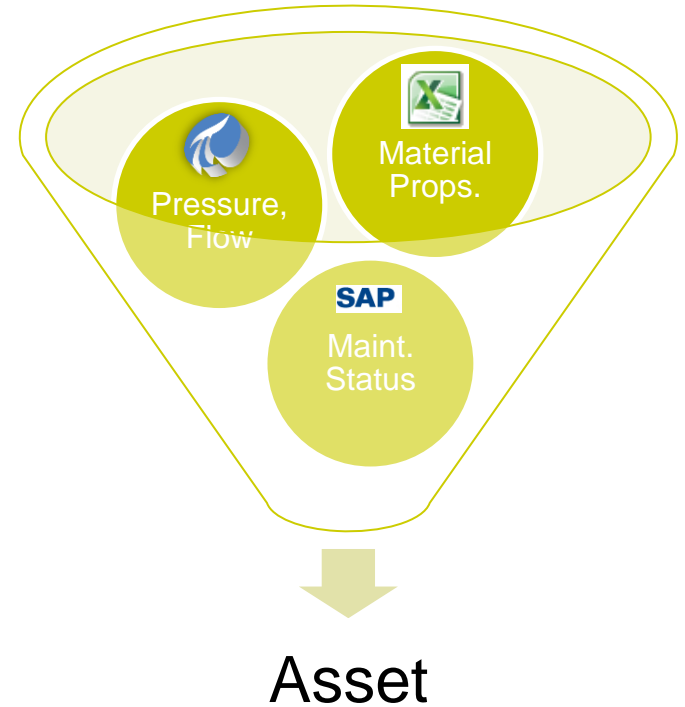
# Add Value to your PI System

The screenshot displays the UC2011-SK - PI System Explorer interface. On the left, a tree view under 'Elements' shows the hierarchy: Big Creek Power Plant, Condenser, Gas Turbine 1, Gas Turbine 2, HRSG 1, HRSG 2, Steam Turbine, and System Configuration. Below this is a 'Library' section with 'Unit of Measure', 'MyPI', 'Notifications', and 'Contacts'. A 'Prices' section is also visible, containing 'Power Factor', 'Electricity Price', 'Gas Fuel Price', and 'Oil Fuel Price'. The main area is a table of data points for 'Gas Turbine 1'.

Property	Value
Compressor Discharge Pressure	16.2847557067871 bar(g)
Compressor Discharge Temperature	433.991912841797 °C
Compressor Inlet Temperature	19.9780979156494 °C
Exhaust Gas Pressure	0.0206421613693237 bar(g)
Exhaust Gas Temperature - #...	594.774108886719 °C
Exhaust Gas Temperature - #...	597.018737792969 °C
Exhaust Gas Temperature - #...	595.317443847656 °C
Exhaust Gas Temperature - #...	598.902770996094 °C
Fuel Oil Flow	-0.0620765015482903 m3/h
Fuel Oil Pressure	15.818398475647 bar(g)
Fuel Oil Temperature	33.3455696105957 °C
Gas Fuel Flow	70317.8671875 m3/h
Gas Fuel Pressure	36.21142578125 bar(g)
Gas Fuel Temperature	68.7641372680664 °C
Gas Turbine Speed	3000.62158203125 rpm
Gross MW Output	261.549621582031 MW
In Service Date	2/25/2009 12:00:00 AM
Inlet Guide Vane Angle	95.78909 %
Inlet Pressure Loss	1.60181736946106 mbar(g)

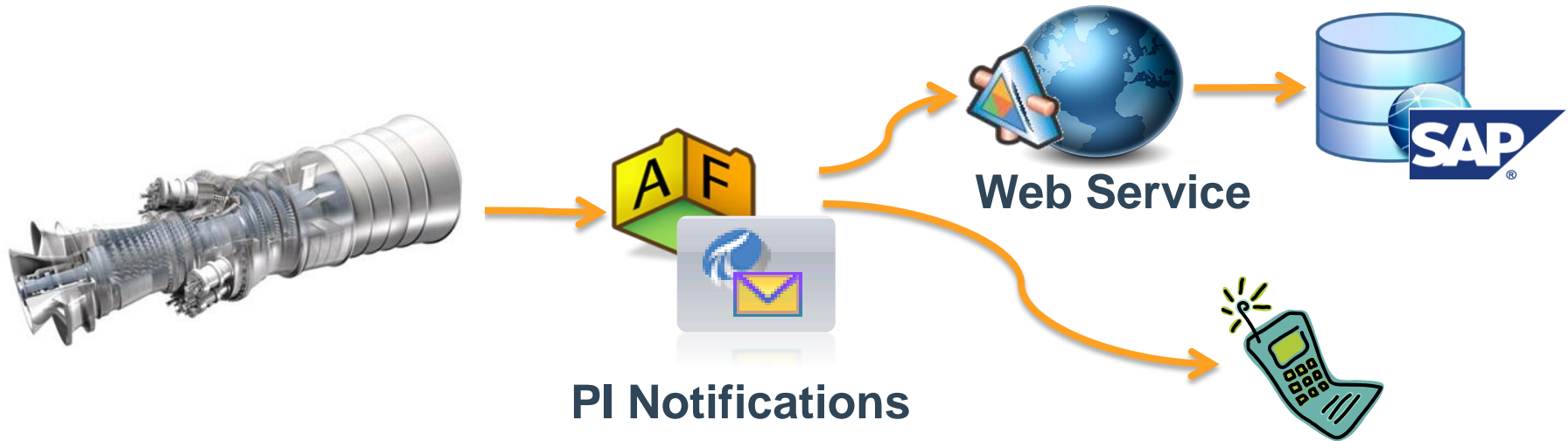
# Add Value to your PI System

- **Tie asset properties to your data**
  - Static values, PI Tags from multiple PI Servers, static or linked Tables
  - Custom data references to other data sources



# Add Value to your PI System

“One of GT exhaust thermocouples has been acting up... Let’s keep an eye on it and create a work order for maintenance if it fluctuates more than 5% in 5 seconds. Make sure Bob is notified of this also.”



# Add Value to your PI System

## Event Frames Are Part of Asset Framework

- GT #2 tripped again last night!!
- How many times has this happened in the last year?
- What were the operating conditions when it tripped?
- Let's find and gather all these events and analyze them.



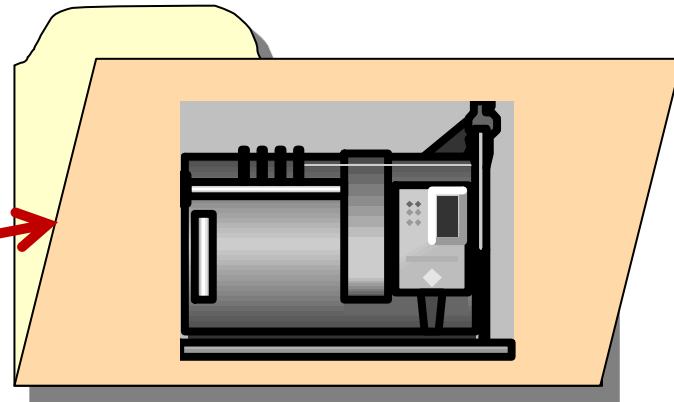
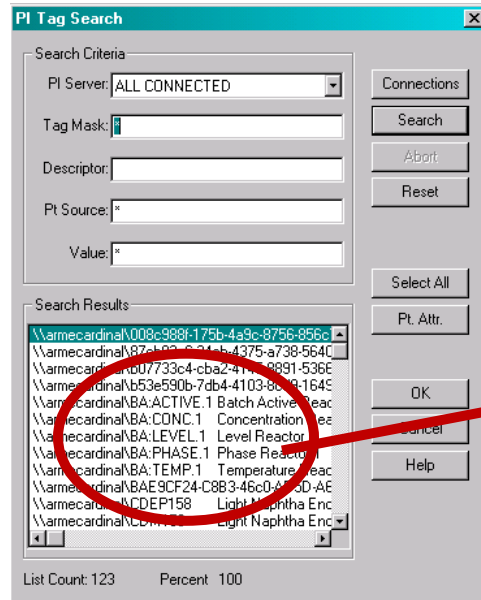
### Downtime Events

- Asset of interest
- Start/End Times
- Reason Codes
- Asset Conditions



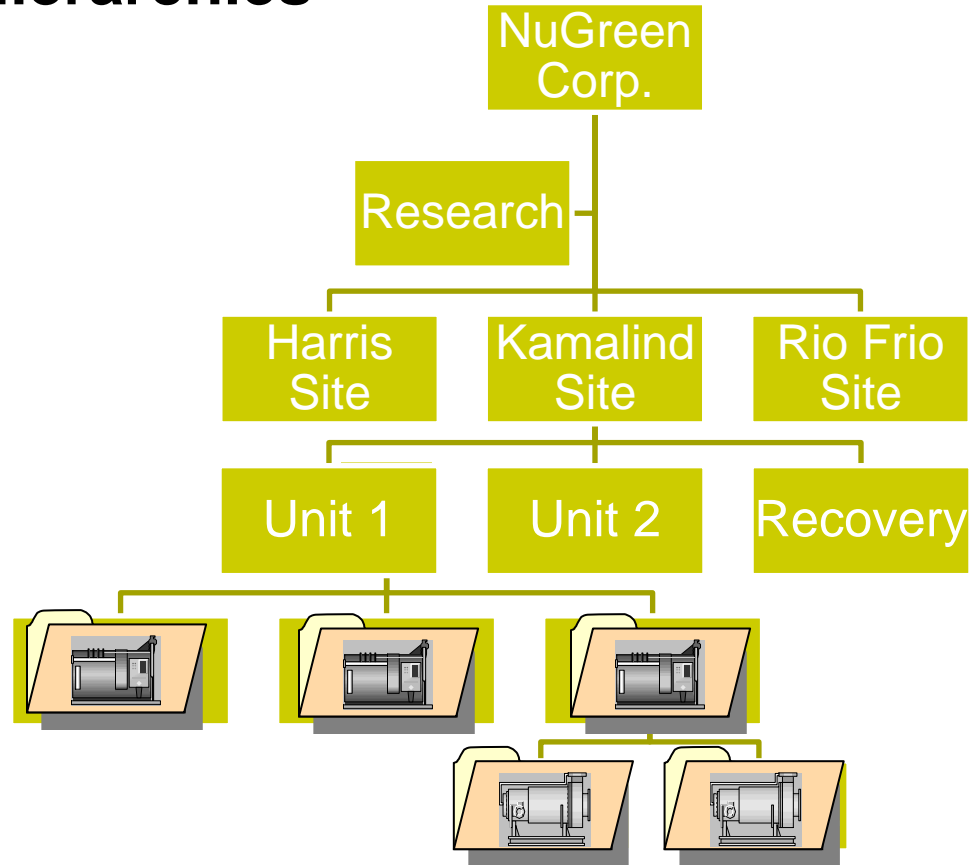
# How to begin

# Sort Your Tags into Elements Which Represent Your Equipment

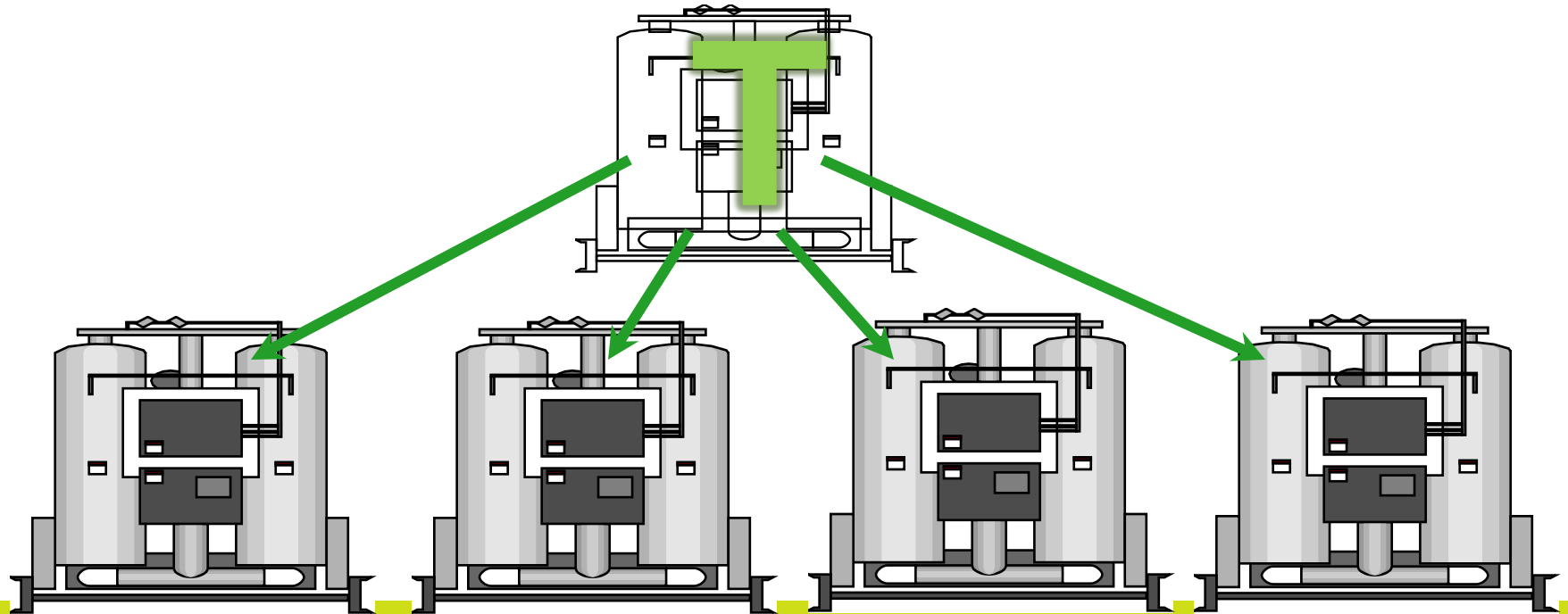




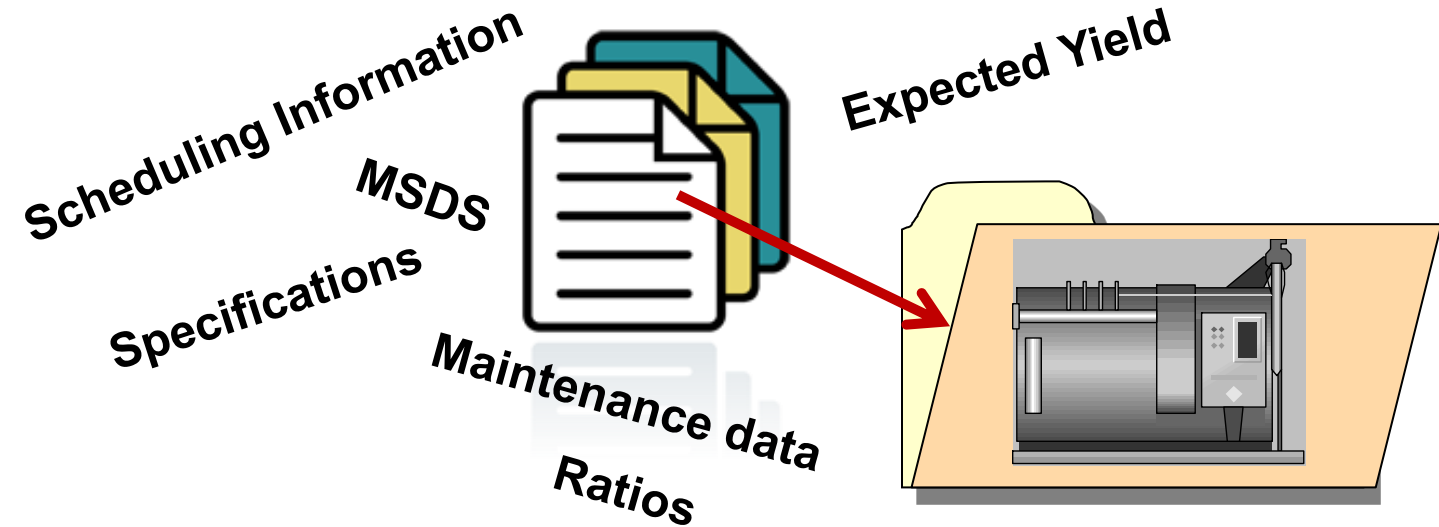
# Organize the Assets into Hierarchies



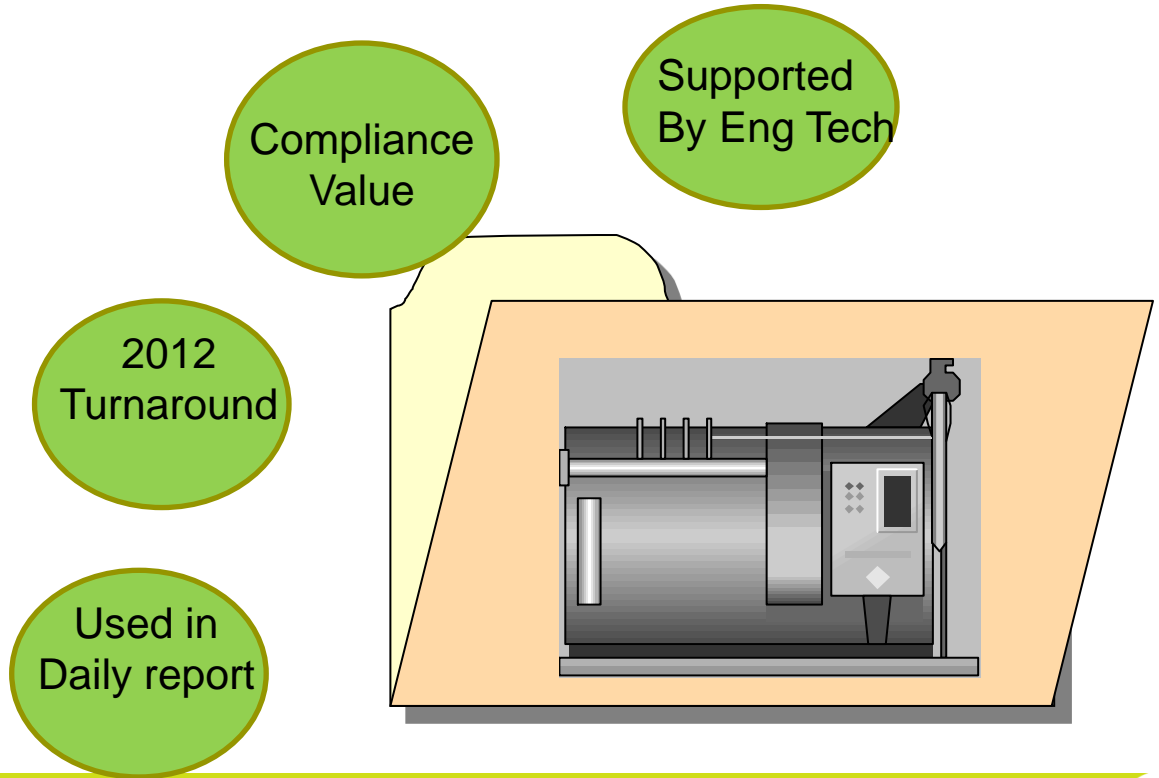
# Manage and Extend Elements by creating Powerful **Templates**



# Add Efficiency Calculations, KPIs, Reference Data from Relational Databases and Other Information to Add More Value



# Add Key Words (Categories) to Make Them Easier to Search for



# It Might Take a Team

**Process “nerds”** – subject matter experts - who understand the data well enough to build the calculations and define the relationships



&



**IT “geeks”** who can wrangle the XML and SQL, to build large databases

# AF – Putting AF into Best Practice

Shaping your data by:

## 1. Defining types of assets

Schema how to attribute Elements



Templates

## 2. Association to a “real” asset

Created from Template



Elements

## 3. Describing the “real” asset

having Units Of Measurements (UOM)

can come via data references from everywhere



Attributes

## 4. Physical/logical asset structure



Hierarchy

## 5. Assets connectivity

Model : Collections of connected elements

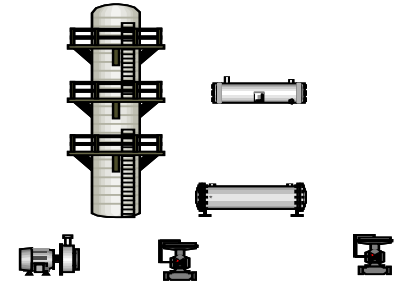
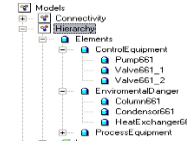


Model

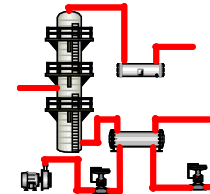
Condensor  
Heatexchanger  
Column  
Valve  
Pipe  
Pump

Column661  
Condensor661  
P661\_1  
P661\_2  
HeatExchanger661  
Valve661\_1  
Valve661\_2

OpeningGrade  
InspectionResult  
LastInspection  
SerialNumber  
XZY



**PI Point:** \\MOBILEVBC\Valve661\_1.OpeningGrade  
**Table Lookup:** SELECT InspectionResult FROM ...  
**Table Lookup:** SELECT LastInspection FROM ...  
**Table Lookup:** SELECT SerialNumber FROM ...  
**Formula:** A=OpeningGrade:[A\*0.98]





\\skwan-vm-af25\NuGreen - PI System Explorer (Administrator)

File Edit View Go Tools Help

Database Query Date Back Check In Refresh New Element Search

### Elements

Elements  
NuGreen

Group by:  Category  Template

Name	Description	Category	Type	Template
NuGreen	Our Company E...	Locations	None	Enterprise

Elements  
Event Frames  
Library  
Unit of Measure  
Replication  
MyPI  
Notifications  
Contacts  
Model Analyses



# Insight PI Asset Framework

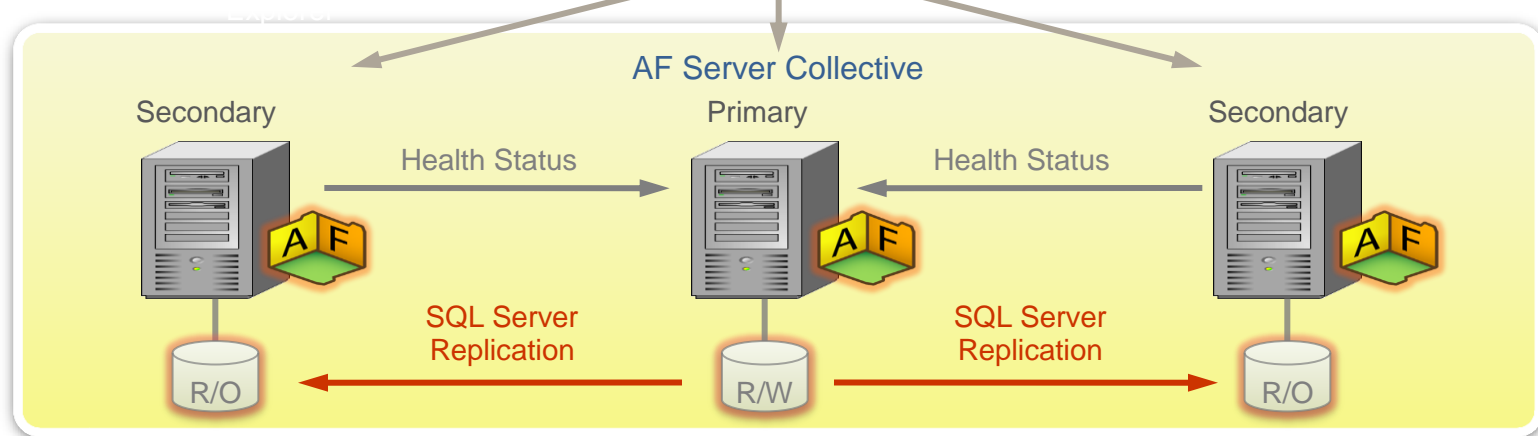
# AF HA Collective



PI Notifications, AF-based PI Clients  
(PI WebParts, ProcessBook, DataLink, etc.)



AF SDK Library



# Extending PI AF

- Enhance functionality of PI AF by your own Plugins
  - Access new data sources (Data References)
  - Notifications to users or systems (Delivery Channels)
- Easy deployment – no ‘roll-outs’ – just register

- Create **domain/industry specific** applications
- Focus on **doing it right**
- Personal development **PI System**
- **Community experience**
- Tech Conference: **OSIsoft vCampus Live!**



```
AFTimeRange tr = new AFTimeRange(new AFTime(tex
AFValues vals = _afDB.Elements["Pump123"].Attri

lstValues.Items.Clear();
foreach(AFValue val in vals)
{

    lstValues.Items.Add(val.Value.ToString() +
}
```

# Mapping assets – User example UC 2012

## PI Asset Framework – PI AF in Janssen

Super Class concept.

- Class based templates – built in conjunction with process and subject matter experts.
- Only process critical information grouped together in a logical model.
- Ensures that the entire organisation have a common taxonomy.

PAS|X \ PI AF

- Using Unit based templates allows us to build unit based MBR elements that can be applied on other sites.

Name	Description	Default Value
Aber Calibration Result	Aber Calibration Result	0
Aber Measurement	Aber Measurement Result	0
Aber Readout	Aber Readout Result	0
BatchID	Batch ID	
Cell Density Controller	Cell Density Controller	0
DO Analyser 1	Dissolved Oxygen Analyser 1	0 %
DO Analyser 2	Dissolved Oxygen Analyser 2	0 %
DO value	Dissolved Oxygen value	0 %
Event		
Process Air Flow Lower Sparge	Process Air Flow Lower Sparge	0 slpm
Process Air Flow Overlay	Process Air Flow Overlay	0 slpm
Process Air Flow Upper Sparge	Process Air Flow Upper Sparge	0 slpm
ID		
Reactor ID	Reactor ID	0
Material Of Construction	Material Of Construction	Stainless Steel
ATF Sample Result	ATF Sample Result	0
pH	pH Value	0
pH Probe 1	pH Probe 1	0
pH Probe 2	pH Probe 2	0
Media Feed	Media Feed	0 l/min
Pressure Test Result	Pressure Test Result	
SIP Cool Down Complete	SIP Cool Down Complete	





# THANK YOU

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